

ANALYSIS

The Employability Problems of Doctorate Holders: Explaining a “French Exception”

While the employability of higher-education graduates in France increases with the level of education, since the early 2000s there has been an exception to the rule for holders of the highest university diploma: in 2007, while young people with master's degrees had an unemployment rate of 7%, the figure for doctorate holders was 10%. Yet doctorate holders constitute a vital human resource in the research sector and, as such, contribute to rising competitiveness in knowledge economies.

Comparative analysis with the other OECD countries, in which unemployment rates for doctorate holders are very low, shows that this situation is not attributable to a glut of graduates. In France, despite the substantial growth of business employment (but for the most part in non-research positions, which also shows the interest of recruiters beyond the realm of research), it is above all the underinvestment in private-sector research and development and, to a lesser extent, the preference shown to engineers when filling research jobs, that impair the employability of doctorate holders, especially in certain disciplines. Lastly, although the low unemployment rate for doctorate holders in the OECD countries is coupled with a greater proportion of fixed-term contracts, that proportion also remains high in France.

Proposal 1: Improve the information available to educational institutions and students, e.g. by having private interests play a greater role in compiling regular data, by fields of study, on recruiting requirements and the hiring of doctorate holders.

Proposal 2: Reaffirm the central role of the Research and Higher Education Centres (PRES) in co-ordinating and regulating the supply of doctoral programmes, in particular by making the PRES responsible for issuing diplomas and funding doctoral contracts.

Proposal 3: Get the *grandes écoles* more involved in doctoral programmes, so that more engineers can prepare doctorates.

Proposal 4: Improve the proportion of dissertations that are sponsored, by business enterprises in particular: first, by setting objectives for universities as part of their contractual relations with the State; and second, by formulating a mechanism whereby a business enterprise could sponsor a dissertation in exchange for the doctoral candidate's pledge to work a specified number of years for the business after being hired.

Proposal 5: Recognise doctorates in collective bargaining agreements, including salary scales.

Conferred by universities, doctorates require at least three years of study beyond a master's degree (which itself requires five years of post-secondary study, hereinafter referred to as "BAC+5") and successful defence of a dissertation. In 2007, France awarded approximately 11 000 doctorates, in all fields of study combined, accounting for some 6% of the degrees conferred in all of the OECD countries. That same year, approximately 70 000 students were working towards doctorates. While the number of doctoral candidates is low in relation to the total number of students in higher education (2 228 188 in 2007), their career paths are nonetheless an important issue for at least four reasons:

- In a knowledge economy, a country's **competitiveness** hinges to a large extent on its capacities for research and innovation. These capacities are in turn dependent on financial, but also human, resources, and especially doctorate holders.
- The doctorate, as the third and final cycle in the bachelor-master-doctorate (BMD) system, is a **building block of the common European higher education and research community**.
- The doctorate is a vehicle for **the image of science and research amongst young people**. The employability problems of young doctorate holders may well heighten disenchantment with doctoral studies or even, at an earlier stage, with certain scientific fields of university study that lead to doctorates¹, thus impairing **the quality of future recruiting**.
- At a time when international rankings of institutions of higher learning are playing an ever-greater role², the employment situation of doctorate holders sends **a negative signal about the international image of doctoral studies in France**, on which **the quality of international scientific co-operation between universities** depends to a large extent.

And today, the employability of doctorate holders is a problem. While the employability of higher education graduates in France increases with the level of education, for the past ten or so years there has been an exception to the rule at the doctoral level: **the unemployment rate is higher for doctorate holders than for persons terminating their studies with master's degrees**.

How can these discrepancies between the situations in France and in the other OECD countries be explained? Does France turn out too many graduates? Are other countries' doctorate holders more employable in the private sector? Does the high unemployment rate in France point to a mismatch between the structure of diplomas by field of study and labour market requirements? Does the employability of doctorate holders in the other OECD countries come at a cost of lesser job security or underemployment?

In France, the labour market for doctorate holders is imbalanced

Lesser overall employability than for graduates with only five years of post-secondary studies

In France, the employability problems of doctorate holders are nothing new³. In response to the growing number of graduates and the recruiting slowdown in the public sector, during the 1970s in particular, the authorities endeavoured to enhance the employability of doctorate holders in the business world, *inter alia* by introducing CIFRE contacts⁴. Creation of the Association Bernard Gregory (ABG)⁵ in 1980 was the culmination of multiple initiatives along these lines. The early 1990s were also a difficult period: given sharp growth in the number of doctoral dissertations (up by more than 56% between 1990 and 1994), the number of public-sector jobs was insufficient, while business recruiting fell off substantially⁶.

Nevertheless, even during these difficult periods, doctorate holders found employment on terms more favourable than those offered to other graduates of higher education, even in the late 1990s⁷ (8% of doctorate holders were unemployed, versus 10% of graduates with master's degrees in 1997). **What is new**

¹ *L'état des lieux de l'emploi scientifique*, Rapport 2009, Observatoire de l'emploi scientifique, Ministère de l'Enseignement Supérieur et de la Recherche.

² Harfi M. and Mathieu C., "Classement de Shanghai et image internationale des universités: quels enjeux pour la France?", *Horizons Stratégiques* No. 2, Centre d'analyse stratégique, October 2006.

³ Pottier F., "Quel avenir professionnel pour les diplômés d'un troisième cycle universitaire scientifique", *Formation et Emploi*, No. 218, April-June 1987, La Documentation française.

⁴ The Industrial Agreement for Training through Research (*Convention industrielle de formation par la recherche* – CIFRE) programme, which was created in 1981 to facilitate the employment of doctorate holders in the private sector, brings together a doctoral student, a public research laboratory and a business enterprise on a common research project. The authorities also made use of fixed-term contracts and replacement appointments in conjunction with the development of contractual appropriations.

⁵ ABG's mission is to promote training through socio-economic research and to help young PhDs in all fields to get jobs: <http://abg.asso.fr/> [Translator's note: ABG's name has since been changed to Intelligence, the website of which is <http://www.intelligence.fr/Page/DocteurAndCo/Default.aspx>.]

⁶ Martinelli D., Paul J.-J. and Perret C., "Emploi public, emploi privé: la difficile conversion des titulaires de thèse", *Bref*, No. 2146, Céreq, 1998.

⁷ Giret J.-F., "De la thèse à l'emploi: les débuts professionnels des jeunes titulaires d'un doctorat", *Bref*, No. 220, Céreq, June 2005.

and troubling is that while the employability of graduates in France increases with the level of education, since the early 2000s there has been an exception to the rule for holders of the highest university diploma: whereas in 2007 young people with master's degrees had an unemployment rate of 7%, the figure for doctorate holders was 10%⁸ (Table 1).

Table 1: Unemployment rate of doctorate holders in France, three years after graduation

	1997	1999	2001	2004	2007
All doctorate holders	8	7	7	11	10
Of which: doctorate holders having received:					
- CIFRE contracts	3	6		6	6
- Research grants		9		9	6
Engineering school graduates	5	2	2	6	4
Holders of a DESS (1)	10	7	5	11	7

(1) Now known as an occupational master's degree (*Master professionnel*).

Source: *Enquêtes du Céreq, situation trois ans après l'obtention du diplôme des titulaires de doctorat en 1994, 1996, 1998, 2001 et 2004.*

However, the rising unemployment rate has spared doctorate holders who during their doctoral studies received financial aid such as research grants (incorporated into doctoral contracts in 2010) and CIFRE contracts. There are three explanations for this achievement:

- 1) Both research grants and CIFRE contracts allow young doctoral students to devote themselves fully to their dissertations, facilitating successful completion of their degrees.
- 2) Both financing mechanisms are highly selective. In the case of CIFRE contracts, there is in fact a contract of employment between the doctoral candidate and a business enterprise and involving a public research laboratory. It therefore presumes that the recruitment criteria of employers (mostly businesses) have been met.
- 3) The period during which a doctoral candidate receives research grants (with employee status and social security cover) is, as in the case of CIFRE contracts, considered to be three years' professional experience, which is highly valued on the labour market.

In addition, an analysis of median salaries shows that there is also a gap between Bac + 5 and Bac + 8 when it comes to salaries: while they earn more than masters, doctorate holders (except those who have had research grants or CIFRE contracts) are paid less than engineers.

All in all, compared to a master's degree, a doctorate would not seem to constitute a significant advantage⁹, even for an engineer who has written a dissertation¹⁰.

An unemployment rate triple that of the OECD countries

OECD/UIS(UNESCO)/Eurostat data compiled in connection with the Careers of Doctorate Holders (CDH) project, in which France did not take part, showed that except in Belgium, the unemployment rate for doctorate holders is low¹¹. A country like the United States, in which the unemployment rate for doctorate holders is low, even shows heavy dependence on scientific immigration. Despite the comparability difficulties inherent in using data from different sources, these findings have been compared to French data from Céreq's "Génération" surveys. The "Génération 2004" survey shows that the average unemployment rate for doctorate holders in France is triple that of the OECD countries (Table 2).

⁸ Among doctorate holders graduating in 2004, 88% were employed, 1.5% were non-active and roughly 1.5% were in training or had resumed their studies at the time of Céreq's "Génération 2004" survey. Another available source – the INSEE employment survey – confirms the rough figure of 10% for doctorate holders less than four years after graduation.

⁹ Perruchet A., *Le doctorat: un investissement rentable? Approches économiques et sociologiques*, L'Harmattan, Paris, 2008.

¹⁰ See, for example, the findings of the 2008 survey of the French National Council of Engineers and Scientists. According to this study, in 2007 the gross salary of engineers under 30 years of age averaged €33 800 per year, versus €37 000 for the others. A majority of them were in R&D and higher education, which pay less than jobs in management and finance.

¹¹ Further information about the project is available at the following OECD link: <http://www.oecd.org/sti/cdh>.

Table 2: Unemployment rates of doctorate holders in 2006 by year of graduation (in %)

	2002	2003	2004	2005	2006	1990-2006
Austria	1.9	2.0	4.2	3.7	7.2	2.4
Belgium	2.9	3.8	5.7	12.8		2.8
Bulgaria	1.2	0.6	0.0	2.7	1.2	1.1
Cyprus	0.0	0.0	0.0	0.0	6.7	1.2
Denmark	0.9	3.2	2.7	4.2		1.7
Spain	1.0	2.3	1.9	2.9	9.5	2.0
Finland	2.5	2.1	3.2	3.5		2.5
Germany	1.3	4.1	3.5	2.5	7.3	2.6
Lithuania	0.0	2.8	0.0	0.9	0.0	0.6
Poland	0.0	0.2	0.4	1.0	6.1	1.1
Portugal	1.3	1.8	0.4	0.4		0.5
Sweden	2.3	2.6	3.5	4.0	4.9	2.2
United States	0.9	1.8	1.2	1.5		1.1

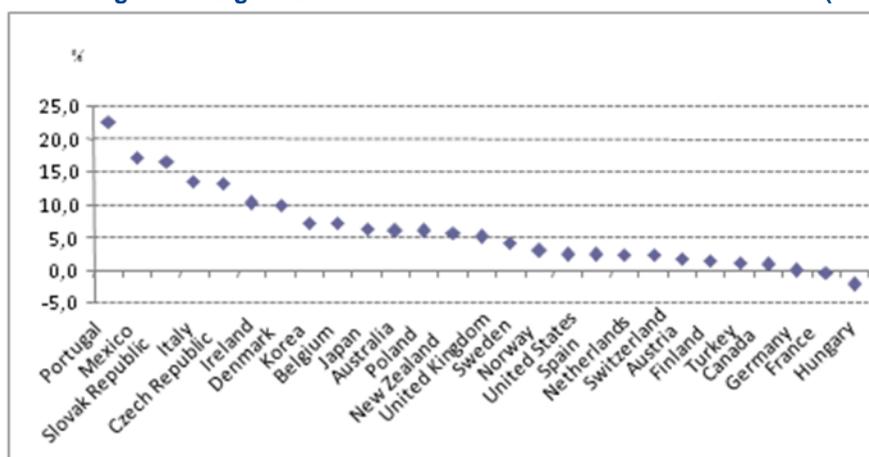
Source: OECD, 2009, OECD/UIS/Eurostat data on careers of doctorate holders.

The unemployment of doctorate holders in France does not stem from any overall “overproduction” of graduates as compared with the other OECD countries

In 2006, 200 000 doctorates were conferred in the OECD countries. **France, accounting for approximately 6% of that total, ranked fifth¹²**, after Japan, the United Kingdom, Germany and the United States (the US alone accounting for over a quarter of the diplomas conferred)¹³. The number of doctorates conferred in the OECD countries rose by over 40% relative to 1998 (+ 60 000). In France, as in Canada and Germany, **the average number of new graduates remained flat** (Figure 1).

In addition, looking at cohorts of young people in a “relevant age group”, the proportion of doctorate holders in France, in both 2006 and 2000, was well below the average for the OECD countries (Figure 2). **As a percentage of a given age group, most of the OECD countries train more doctorate holders than France**, whereas those countries already have a substantial pool of potential researchers. Their goal is therefore not to fill any gap in the number of researchers. Data for 2006 show that France had 7.7 researchers for every 1 000 working people, behind Japan (10.7), the United States (9.3), Finland (15) and Sweden (12). But France does lead countries such as Germany (6.7) and the United Kingdom (6.1).

Figure 1: Average annual growth rate of the number of doctorates conferred (1998-2006)

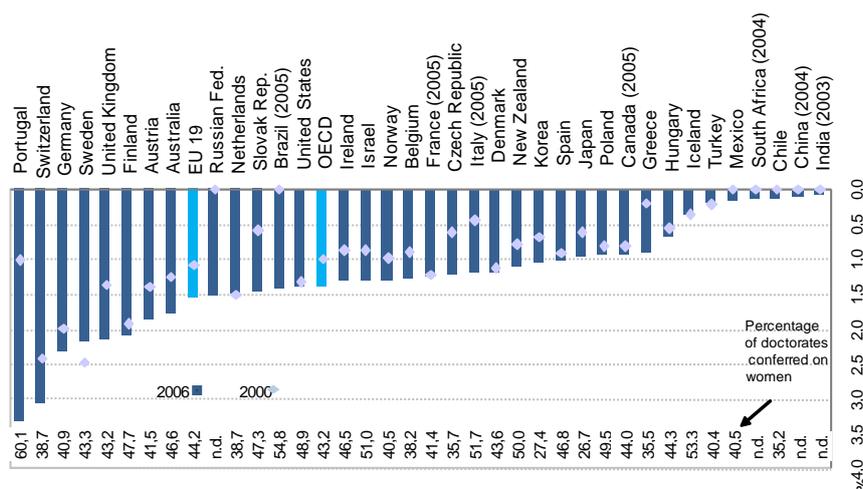


Source: OECD, Education Database, 2009.

¹² In addition, this position would seem fairly consistent with the country's ranking with regard to scientific publications.

¹³ Recent data estimate that 49 000 doctoral degrees were conferred in 2008 – the highest level ever attained by the United States, even though the growth rate for diplomas has declined in recent years. See in particular the report entitled *Doctorate Recipients from U.S. Universities: Summary Report 2007-08*, NSF 10-309, November 2009 and “Number of U.S. Doctorates awarded rise for sixth year, but growth slower”, *NSF InfoBrief* No. 10-308, National Science Foundation, November 2009.

Figure 2: Graduation rates at doctorate level as a % of the corresponding age group, 2000 and 2006



Source: OECD, Education at a Glance 2008, OECD Indicators.

These indicators show that the deteriorating job market for doctorate holders in France is not due to growth in the number of graduates. **The other OECD countries have recorded very low unemployment rates, whereas growth in the number of graduates was far greater there than in France between 1998 and 2006.**

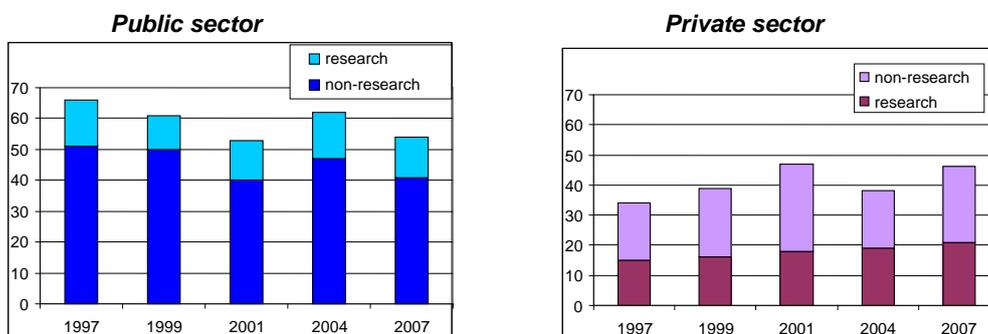
Underinvestment in research and development and a preference for engineers hamper the employability of doctorate holders in business enterprises

Substantial growth in business employment, but for the most part in non-research positions

In all of the OECD countries except Austria, a majority of doctorate holders are employed in the higher education and government sector. The proportion of researchers in this sector that hold doctorates ranges from 57% in the United States and Belgium to just over 93% in Poland.

In France, the public sector is still the primary employer for doctoral students (54%). With the exception of the “Génération 2001” study, however, Céreq survey data show **an upward trend in the private sector, for which the corresponding proportion was 46% in 2007** (Figure 3). This proportion does not reflect the preferences of doctorate holders, over 70% of whom would like to work in public-sector research¹⁴.

Figure 3: Employment opportunities for doctorate holders in France, by sector and type of job (in %) (1)



(1) Employment three years after graduation
Source: “Génération” surveys, Céreq.

¹⁴ D'Agostino A., Calmand J., Moncel N., Sulzer E. and Lozier F. “Intégrer l'entreprise privée avec un doctorat: l'exemple de la branche ingénierie, informatique, études et conseil”, *Bref*, No. 268, Céreq, October 2009.

Contrary to a widely held belief, **research is far from the sole employment opportunity for doctorate holders.** In 2007, in France, 38% of doctorate holders graduating in 2004 held non-research jobs. It was in the private sector that this proportion was highest, at over half of doctorate holders (*Figure 3*). Compared with data for 1999, growth in the private sector's share of doctorate-holder recruitment was the same (up by 6 points) for research and non-research positions (respectively 21% and 25% of doctorate holders employed in the private sector in 2007). In the public sector, even though the proportion of non-research jobs was lower than in the private sector, that proportion was nonetheless nearly one out of four doctorate holders. In the OECD countries for which data are available, a majority of doctorate holders are employed as researchers, but the proportion of researchers with doctorates varies by country (from 50% to 80%).

The number of research jobs in the private sector remains structurally low

In France, growth in the private sector's share of doctorate-holder employment mirrors trends in the private sector's share of the national R&D effort: 204 000 researchers (full-time equivalent) in 2005 versus 152 000 in 1999, or growth of 30%. Over that period, the private sector even became the majority employer, with 53.5% of researchers in 2005, as opposed to only 46.8% in 1999. Nevertheless, this growth gave no significant boost to the recruitment of doctorate holders.

Three factors can explain the lack of research jobs for doctorate holders in the private sector:

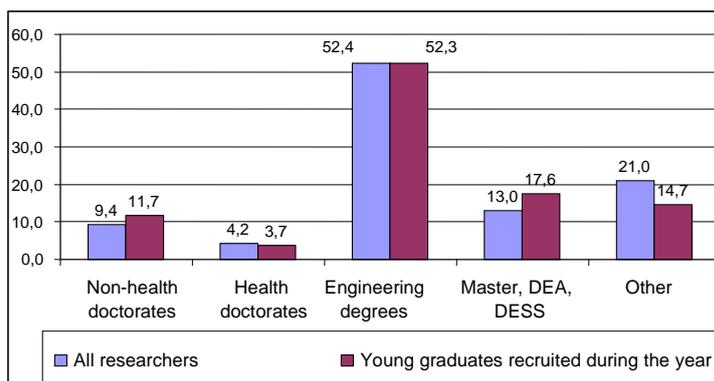
- The very occupation for which doctorate holders are recruited has changed. As has been seen, **with doctorate holders accounting for less than half the total, fewer and fewer of them are being recruited for research jobs in the private sector.**
- Furthermore, the employment of doctorate holders by business enterprises is growing at a lesser pace than private-sector research. In contrast to the public sector, where a doctorate is an absolute requirement for a job as a researcher or a teacher/researcher, in the private sector doctorate holders constitute only a marginal proportion of aggregate research personnel. The fact of the matter is that **even when recruiting for research posts, businesses prefer engineering profiles to doctorate holders** (because of the reputation of the French *grandes écoles*, and the fact that many employers know little about universities, and so on). Doctorate holders accounted for only 13.6% of business researchers (including holders of health-related doctorates), versus over 50% for engineers. This is nothing new in France, as is shown by employment data for research that are broken down by degree and set young graduates apart from researchers who were already working in 2007 (*Figure 4*). Many businesses are clearly reluctant to recruit doctorate holders, even for research jobs¹⁵. Some of the literature on the subject points to the low visibility of the doctoral programmes available and their lesser interconnections with the business world¹⁶. The nature of research activities in the private sector, which are focused more on developing products and processes than on fundamental research, is an important factor but cannot on its own explain such a gap. Lastly, the educational background of private-sector élites is probably not an extraneous factor, since a large majority of recruiters themselves have non-university backgrounds (moreover, this lack of familiarity with the world of research may accentuate the previous factor).
- **In comparison with the other OECD countries, the low business employment rates of doctorate holders are due in part to underinvestment in private R&D.** The French public research effort (as a proportion of GDP) is at a level comparable to that of the OECD reference countries. The low investment in research and development in France therefore stems in great part from the private sector¹⁷, despite the government policies carried out in France, European arrangements (including the Framework Programme for Research and Development, FPRD) and the bold goal set by the Lisbon strategy some ten years ago (3% of GDP for investment in research and development). Consequently, it is less a glut of doctoral graduates than a weakness in private-sector R&D investment that explains this unique situation in France.

¹⁵ See for example Duhautois R. and Maublanc S. "Chercheurs dans le privé: la place des docteurs", *Connaissance de l'emploi*, No. 226, February 2006 and "Quelle place pour les jeunes chercheurs en France ?", Dossier de la *Lettre de l'Association nationale de la recherche technique* (ANRT), January 2006.

¹⁶ Lehman J.-C. (group chair), Fixari D. and Pallez F. (*rapporteurs*), *Propositions pour favoriser l'emploi des docteurs*, Findings of the *FutuRis* working group, June 2005.

¹⁷ Dhont E., "R & D et structure des entreprises: une comparaison France / États-Unis", *La Note de veille*, No. 173, Centre d'analyse stratégique, April 2010.

Figure 4: Business enterprise researchers by highest degree attained (2007, in %)



Source: L'état des lieux de l'emploi scientifique en France, *Observatoire de l'emploi scientifique, Rapport 2009, Ministry for Higher Education and Research.*

These trends show the diversity of jobs obtained by doctorate holders, increasingly in the private sector. Similarly, the growth in non-research jobs shows that doctorate holders acquire transferable skills that allow them to perform other functions. As doctorate holders in non-research positions become more common in business enterprises, this should help ease the employability problems of people with doctorates, albeit to an extent that probably varies widely from one field to another.

Employability problems are worse in certain fields

In France, holders of doctoral degrees break down as follows (2004 data):

- 40% have written dissertations in the humanities and social sciences: 25% in "Letters and the humanities"; and 15% in "Law and economics".
- 60% have written dissertations in science and engineering: 21% in "Mechanics, electronics, computer science and engineering sciences"; 18% in "Life and earth sciences"; 12% in Chemistry; and 9% in "Mathematics, physics".

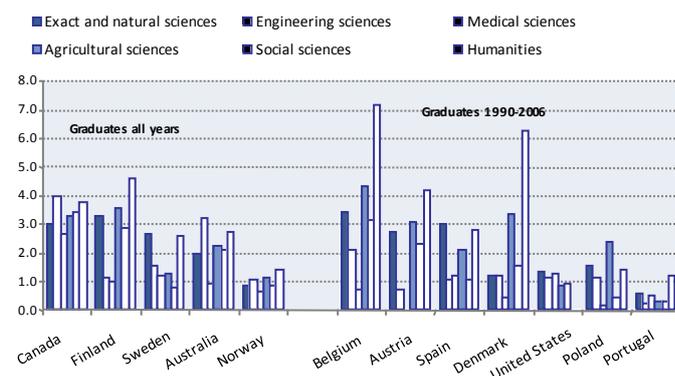
Holders of doctorates in these fields do not all have an equal chance of facing unemployment (Table 3).

Table 3: Unemployment rates for doctorate holders in France, by field

	1999	2001	2004	2007
Mathematics, Physics	5%	5%	7%	9%
Mechanics, electronics, computer science, engineering	2%	2%	6%	6%
Chemistry	14%	10%	14%	16%
Life and earth sciences	8%	7%	11%	10%
Law, Economics, Business admin.	7%	5%	11%	8%
Letters, Humanities	6%	20%	17%	11%
All fields combined	7%	5%	11%	10%

Source: Céreq surveys, situation of doctorate holders three years after graduation in 1994, 1996, 1998, 2001 and 2004.

Figure 5: Unemployment rates for doctorate holders in the OECD countries, by groups of fields (2006) ¹



(1) Note: 2005 data for Belgium and Norway; 2005 data and 1987-2005 graduates for Denmark
Source: OECD, 2007 and 2009 OECD, UIS and Eurostat data collections on the careers of doctorate holders.

Certain groups of fields of study experience below-average unemployment rates: "Law, economics and management" (8%) and "Mechanics, electronics, computer science and engineering sciences" (6%). The fields "Law, economics and business administration" are much less dependent on the public sector (48% of jobs held). Nevertheless, the proportion of doctorate holders in non-research jobs is still very high there, with one doctorate holder out of two. Graduates in "Mechanics, electronics, computer science and engineering sciences" are set apart by a high percentage of doctorate holders working in research (over 70%), and the preponderance of the private sector as their employer (58%); they do better on the labour market, including in the private sector, even though they are the most exposed to competition from engineers, many of whom occupy research positions in business enterprises.

Other groups of fields of study have near-average unemployment rates: “Mathematics and physics” (9%) and “Life and earth sciences” (10%). While the rates of dependency on public-sector employment differ (respectively roughly 60% and 47%), the proportions of graduates occupying non-research positions are fairly similar (respectively 30% and 26%).

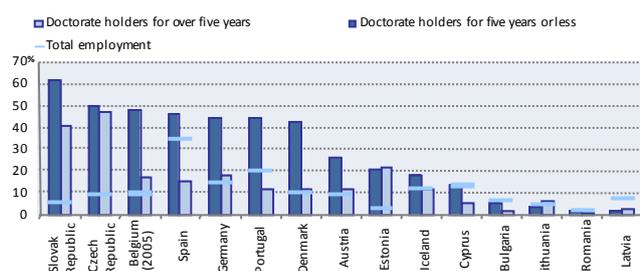
Lastly, some fields feature above-average unemployment rates: “Chemistry” (16 %), “Letters and the humanities” (11 %). Roughly a third of graduates in “Chemistry” are recruited for non-research jobs. Those in “Letters and the humanities” also experience great difficulty, although their lot has improved significantly since 2001. Consequently, their unemployment rate three years after obtaining their doctorates decreased from 20% for 1998 graduates to 11% for 2004 graduates. Nevertheless, approximately 50% of the 2004 graduates who were working in 2007 occupied non-research jobs, and nearly 75% of them had been hired by the public sector. Holders of doctorates in “Letters and the humanities” in the OECD countries also have more difficulties than those in other fields of study, but their unemployment rates are lower than they are in France (Figure 5).

In all, **fields in which unemployment rates are above-average or average (“Letters and the humanities”, “Chemicals” and “Life and earth sciences”)** account for more than half (55%) of all doctorate holders. This shows that while there is no overall glut of graduates, the issue is more one of the distribution by field of study.

The ready employability of doctorate holders in the OECD countries comes with a higher proportion of fixed-term contracts

If the unemployment rate is taken as an indicator of employability, the employment situation of doctorate holders is more favourable in the OECD countries overall than in France. However, this situation must also be assessed with an eye to the kinds of jobs held. Here, analysis of the proportion of fixed-term contracts in the employment of doctorate holders mitigates the findings. Five years after graduation, over 60% of doctorate holders in the Czech Republic were on fixed-term contracts, and the proportion exceeded 45% in Germany, Belgium and Spain, whereas the proportion was approximately 20% in those countries for all dependent employees combined (Figure 6). In the case of the United States, the proportion of doctorate holders on fixed-term contracts at universities was very high¹⁸, especially among recent graduates (Figure 7). In 2006, this was the case for roughly one doctorate holder out of two – a proportion four times as great as it had been in the early 1970s (only 12% in 1972). Part of the explanation for this sharp growth is the greater frequency of post-doctoral work, especially with the development of research project financing. This situation does not seem to have impaired that country’s attractiveness to foreign doctorate holders and doctoral candidates. On the contrary, numerous young people go to the United States on temporary or permanent stays in order to carry out their doctoral or post-doctoral research.

Figure 6: Percentage of 1990-2006 doctoral graduates employed on fixed-term contracts

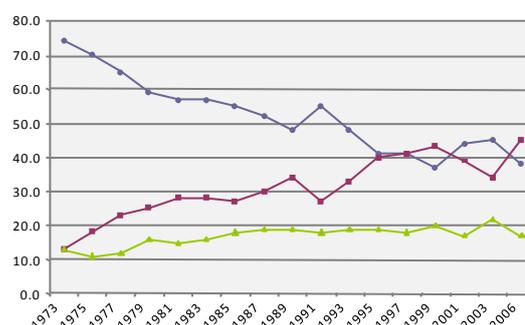


(1) For Denmark, 1987-2005 graduates.
Source: OECD, 2007 and 2009 OECD, UIS and Eurostat data collections on the careers of doctorate holders and employment database.

Figure 7: Holders of doctorates in science and engineering employed by US universities, by type of employment

Doctorates obtained within the past three years

% — Full-time instructors — Post-docs — Other full-time jobs



Source: National Science Foundation, Division of Science Resources Statistics, Science and Engineering Indicators 2008.

In France, even if the proportion of fixed-term contracts is high and increased by ten percentage points between 1999 and 2007, it is nonetheless smaller than in some other OECD countries. The Céreq survey showed that in 2007 **just over a quarter of doctorate holders were on fixed-term contracts three years after graduation**. This figure remains substantial if one considers the fact that three years after their

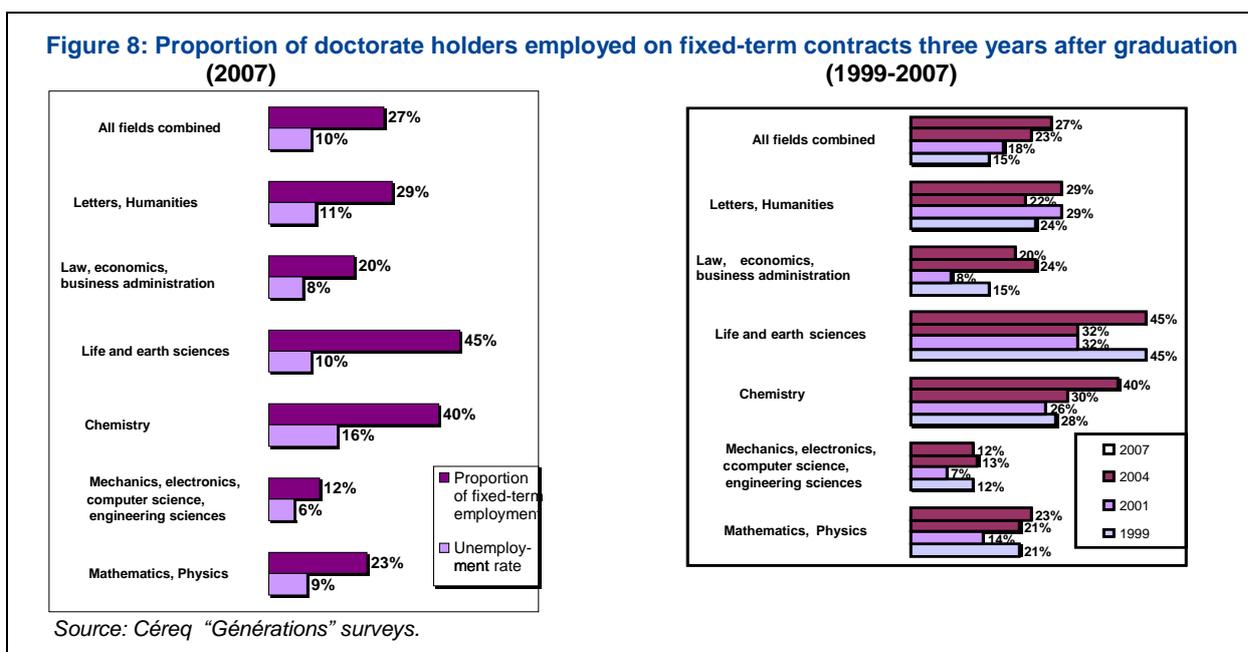
¹⁸ Only some of the teaching staff of American universities are promoted to the status of tenured professor, which involves employment for an unlimited duration. See in particular Hegège S. and Bénard C., “Le statut des chercheurs aux États-Unis”, note by the Mission for Science and Technology, Embassy of France in the United States, April 2004.

dissertations, post-doctoral scholarship has usually been completed, and that teaching and research grants such as ATER (*attaché temporaire d'enseignement et de recherche*) are paid only for a limited time after graduation. The proportion of fixed-term work for doctorate holders differs significantly, depending on how their doctorates were funded. Persons receiving research grants or CIFRE contracts have below-average unemployment rates. But only CIFRE contract recipients, for the reasons cited above, enjoy greater employment stability, with an average of only 15% working on a fixed-term basis.

This situation also varies by fields of study (*Figure 8*). "Chemistry" and "Life and earth sciences" showed the greatest proportions, with over 40% of doctorate holders on fixed-term contracts. But in the case of "Chemistry" alone is a greater proportion of fixed-term contracts combined with a very high unemployment rate. These disciplines are followed by "Letters and the humanities", where the proportion of doctorate holders on fixed-term contracts is 30%¹⁹. Just under a quarter of persons with doctorates in "Law, business administration and economics" and "Mathematics and physics" are employed on fixed-term contracts.

It is in the group "Mechanics, electronics, computer science and engineering sciences" that the percentage of fixed-term contracts is lowest, at just over one out of ten doctorate holders. It should be recalled that these disciplines also show below-average unemployment rates and depend on the private sector for 58% of their aggregate employment.

In the OECD countries, the proportion of doctorate holders working on fixed-term contracts also varies according to groups of fields of study. For all doctorate holders graduating between 1990 and 2006, roughly one quarter of persons with doctorates in the realm of "Health" (medical sciences) and in "the Humanities" were employed on a fixed-term basis, versus only 12% in "Natural sciences" and 7% in "Engineering sciences".



In all, **no clear conclusion can be drawn from the situations by academic discipline as to a significant correlation between the unemployment rate and the proportion of doctorate holders working on a fixed-term basis** (*Figure 8*). Above all, they show the diversity of actual circumstances. In some fields, the coexistence of a high unemployment rate and a large proportion of fixed-term contracts stems from the need for doctorate holders to engage in one or more post-doctoral programmes in order to increase their chances of success in competitive examinations for public research positions. The funding of such post-doctoral work is facilitated by the development of project-based research financing in other disciplines. The higher proportion of fixed-term employment is generally the reflection of a long process of finding work, as for other young graduates in sectors where unemployment runs high. Whatever the field of study, breaking into employment can be even more difficult for doctorate holders, who are forced to take jobs that have nothing to do with their qualifications.

Lastly, the quality of jobs held by doctorate holders could not be assessed solely on the basis of the proportion of fixed-term contracts. **Other criteria have to be factored in, such as the fit between jobs and**

¹⁹ An econometric analysis of individual data from the "Génération 2004" survey shows that holders of doctorates in "Chemistry", "Life and earth sciences" and "Letters and the humanities" have a higher probability of being employed on a fixed-term basis (Calmand J. and Giret J.-F., *Rapport final sur l'insertion des docteurs issus de la génération 2004*, June 2009).

qualifications, and salary levels. In this regard, the available statistical data show that France was no better off in comparison with the other OECD countries. In 11 OECD countries, at least 10% of doctorate holders had jobs unrelated to their qualifications. And in a majority of OECD countries for which data are available, doctorate holders were better paid when they were not working in research jobs, especially outside the private sector. In France, non-research jobs in some cases entailed underemployment. For example, data in the “Génération 2004” survey show that 17% of those having doctorates in the “Letters and the humanities” group of disciplines and working in the public sector were primary or secondary school teachers (8% in “Mathematics and physics” and 6% in “Chemistry”)²⁰. Here, there is both underemployment and a lower level of salary.

Proposals for better regulating the supply of doctoral programmes and upgrading support for doctorate holders

In the years ahead, the increased recruiting of doctorate holders by the private sector, which will have to step up its investment in research, will not obviate the need to intervene on other levers, such as **regulating the supply of doctoral programmes, improving the funding rate for dissertations or enhancing the recognition of doctorate holders by the world of professionals.**

Proposal 1: Improve the information available to educational institutions and students, e.g. by having private interests play a greater role in compiling regular data, by fields of study, on recruiting requirements and the hiring of doctorate holders.

If educational institutions and students are to be kept properly informed, the first imperative is **knowledge of labour-market requirements.** Despite the growth of doctorate sponsoring²¹ and the recent participation of business enterprises in advising schools that confer doctorates, private-sector involvement is still limited in relation to its importance in the labour market for doctorate holders, which has become equivalent to that of the public sector. **Business enterprises will have to be invited to play a greater role** in exploring avenues of research and how educational programmes might evolve. At present, in the realm of doctoral studies, it is CIFRE contracts that represent the most highly developed form of this public/private co-operation, involving contracts between doctoral candidates, business enterprises and research laboratories. This joint brainstorming should take place regularly and focus on employment prospects by fields of study.

The strengthening of ties between business enterprises and doctoral schools should also **make it easier for universities to monitor the employability of doctorate holders.** Such monitoring is still scant, especially in life sciences and in the humanities and social sciences²². Schools that confer doctorates should be more involved (and do so with targeted means) and **evaluated against the objective** (performance indicators).

Lastly, there should be **wide distribution of the findings of this work**, which could benefit all institutions and doctoral candidates, allowing students to make better-informed choices. More generally, doctoral candidates should be entitled to **assistance in formulating career projects**²³.

Proposal 2: Reaffirm the central role of the Research and Higher Education Centres (PRES) in co-ordinating and regulating the supply of doctoral programmes, in particular by making the PRES responsible for issuing diplomas and funding doctoral contracts.

Improving the employability of doctorate holders requires greater coherency between the recognised requirements of the public and private sectors and the flows of diplomas in the various fields of study. This regulation of the supply of doctoral studies should take place in conjunction with the development of Research and Higher Education Centres (*Pôles de recherche et d'enseignement supérieur*, PRES²⁴), for which doctorates constitute a main focus of activity. One of the Centres' missions is thus to **co-ordinate** the doctorate-conferring schools of the member institutions as a first step in formulating a joint policy on doctoral

²⁰ In a study on doctoral candidates in social sciences at the University of Grenoble, V. Mangematin and N. Mandran show that doctorate holders in non-research jobs were frequently underemployed (“Carrières des docteurs en sciences sociales: qu'apporte une thèse?”, *Revue de gestion des ressources humaines*, No. 39, pp. 57-71, 2001).

²¹ A scheme created in 2007 whereby business enterprises that fund doctoral dissertations can reduce their taxes by 60% of payments made.

²² In its 2010 assessment report, prepared in connection with the contractualisation between the State and the universities (wave D), the Research and Higher Education Evaluation Agency (AERES) noted the weaknesses of doctorate-conferring institutions in this area, especially in the fields of life sciences and humanities and social sciences.

²³ Here, one could cite the actions of the ABG to make doctoral candidates aware of the need to formulate a career project. See for example the work by Baty-Sorel F., Deloffre-Vye F. and (under the direction of) Pretcelle M., *Projet professionnel et doctorat, un duo gagnant*, ABG, Collection Doc&Co, Groupe Eyrolles, Paris, 2009.

²⁴ The aims of the PRES, established by law in 2006, are to co-ordinate universities, *grandes écoles* and research bodies in order to facilitate the territorial structuring of higher education and research and to help enhance the international reputations of institutions of higher learning.

programmes. Discussions between the central government and the Centres to prepare four-year contracts should ultimately constitute a vehicle for regulating the supply of doctoral programmes.

Beyond mere co-ordination, to give the Centres the resources needed to provide effective regulation will entail, *inter alia*, giving them the authority to issue diplomas and the resources to finance doctoral contracts. And yet today virtually all of the Centres merely certify doctorates conferred by member institutions, and “application of the Act on the Freedoms and Responsibilities of Universities (LRU) has caused funding for doctoral candidates to be commingled with the institutions’ total wage bill”²⁵. The necessary changes could be made immediately in institutions responding to the “Initiatives of Excellence” appeal for projects. These changes could be made only **on a voluntary basis by PRES founding institutions, which would transfer their authority to confer diplomas to the PRES, under legislation that has been clarified with regard to this option and the terms of its implementation.**

Proposal 3: Get the grandes écoles more involved in doctoral programmes, so that more engineers can prepare doctorates.

Better regulation of the supply of doctoral programmes also entails developing ties between universities (which alone can confer doctorates) and the *grandes écoles*, in particular via Research and Higher Education Centres which would then be fully justified, even if there were no prospects that the member institutions would merge. This would mitigate the effects of young people’s distaste for doctoral programmes by letting more engineers prepare doctorates. Moreover, to incorporate the *grandes écoles* into doctoral institutions could generate greater interest in doctorates on the part of business enterprises. Lastly, businesses would stand to gain, especially with regard to their research activities, if their executive ranks were to include people who were more familiar with the world of research.

Proposal 4: Improve the proportion of dissertations that are sponsored, by business enterprises in particular: first, by setting objectives for universities as part of their contractual relations with the State; and second, by formulating a mechanism whereby a business enterprise could sponsor a dissertation in exchange for the doctoral candidate’s pledge to work a specified number of years for the business after being hired.

Despite the efforts that have been made over the past 20 years, the proportion of unsponsored doctoral candidates remains high in France (estimated at one in three doctoral candidates whose circumstances are known²⁶). The introduction of doctoral contracts in the autumn of 2009 was a real step forward²⁷, by enhancing the professional nature of doctorates. This in fact enshrined the dual status of doctoral candidates, which already existed under CIFRE contracts: as university students and corporate employees. While the quality of proposed dissertations must be the primary condition for doctoral sponsoring, **care must however be taken to ensure that the allocation of funding by discipline matches the employability prospects of the graduates.**

One possible course of action would be to **assign objectives to universities, as part of their contractual relations with the State, for improving the percentage of sponsored dissertations.** This would give them an incentive either to change how they use the financial resources at their disposal or to make greater efforts to enlist business enterprises.

A second course of action, going beyond mere corporate sponsorship, would be to **consider creating a corporate dissertation funding mechanism involving a pledge by the doctoral candidate to work a specified number of years for the sponsoring firm after being hired.** In particular, this would provide security for innovative SMEs seeking high-potential researchers.

²⁵ Aimé P., Berthé T. and Korolitski J.-P., *Développement des PRES et reconfiguration des sites universitaires*, report by the General Inspectorate of the National Education and Research Administration (IGAENR), March 2010.

²⁶ Rapport 2009, l’Observatoire de l’emploi scientifique, *op. cit.*

²⁷ Decree No. 22009-464 of 23 April 2009 on doctoral candidates under contract to public institutions of higher learning and research and the Circular of 24 June 2009. The doctoral contract introduced other paid activities in addition to dissertation preparation.

Proposal 5: Recognise doctorates in collective bargaining agreements, including salary scales.

With regard to the public sector, an upgrading of starting salaries in higher education was introduced in 2010, *inter alia* following the recommendations of the report by the Academy of Sciences²⁸. In the private sector, the employability of doctorate holders is still difficult despite numerous actions to heighten the awareness of business enterprises²⁹. Despite the existence for over 30 years of CIFRE contracts, which forge close links between businesses and the training of some doctoral students (today, an average of 1 300 contracts per year), and the fact that for several years now the cost of recruiting doctorate holders has been factored into the calculation of research tax credits, doctorates are still not recognised explicitly in collective bargaining agreements, with the recent exception of the agreement for the chemical industries. And yet, such recognition is called for in the 2006 Research Act, although not in a binding manner³⁰. It is also the corollary of closer ties between businesses and reflections on the training and careers of doctorate holders. It is true that the recognition of education in collective bargaining agreements focuses more on skills than diplomas; it is therefore necessary that universities, as part of a **quality initiative** that factors in the specific characteristics of each field of study, clearly define the skills that are required while preparing doctorates; and that they discuss these skills with business enterprises. Once this work has been undertaken, it will be time for the State to implement Article L. 411-4 of the Research Code, originating in the Act of 18 April 2006, which calls for the **convening of committees made up of the signatories to collective bargaining agreements in order to discuss conditions for the recognition of doctorates**, beginning with the main sectors concerned.

Besides the downstream issue of the employability of doctorate holders, a second cause for concern, upstream, is the substantial mid-dissertation drop-out rate. The drop-out rate for doctoral candidates is in fact still very high, with roughly one out of every two candidates in the humanities and social sciences, versus one in ten in the “hard” sciences³¹. The proposals made here with regard to the regulation of supply would also help reduce the number of programmes. Efforts carried out to lend doctoral candidates support are also important: schools that confer doctorates, and more recently the PRES, have already accomplished much (common dissertation charter, actions for advisers or doctoral students such as training in project management or communication, intellectual-property training, etc). All of these initiatives should be evaluated and, if necessary, strengthened. However, in some scientific fields, these efforts will succeed only if they are accompanied by improvements to physical facilities (Operation Campus, Excellence Initiatives and other actions in connection with “investments for the future”).

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²⁸ Hoffman J., *Attractivité des carrières de la recherche*, Académie des sciences, Report to the Minister for Higher Education and Research, July 2008.

²⁹ Once again, one could cite initiatives of the ABG, and more recently the book by Carrias B. (preface by Laurence Parisot), *Recrutez un docteur pour booster votre entreprise*, Eyrolles, Docs&Co Collection, 2009.

³⁰ See Article 7, Chapter II of Act No. 22006-450 of 18 April 2006 (Article L. 411-4 of the Research Code).

³¹ Béret P., Giret J.-F. and Recotillet I., *Étude sur la mobilité des jeunes docteurs après la thèse*, Céreq and LEST, November 2002.